Electronic Version
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Claims

[c1] 1. A process for removing SO_2, NO, and NO_2 from a gas stream comprising the steps of
a. oxidizing at least a portion of NO in a gas stream to NO_2 with an oxidizing means resulting in a mole ratio of SO_2 to NO_2 of at least 2.5 to 1, followed by
b. scrubbing at least a portion of SO_2, NO, and NO_2 from the gas stream with a scrubbing solution
comprising ammonia, and
having a pH between 6 and 8, and
c. removing at least a portion of any ammonia aerosols generated from the scrubbing step from the gas stream with an aerosol removal means.

[c2] 2. The process of claim 1, wherein said oxidizing means is an electrical discharge reactor.

[c3] 3. The process of claim 2, wherein said electrical discharge reactor is a dielectric barrier discharge reactor.

[c4] 4. The process of claim 3, further comprising the step of oxidizing at least a portion of the NO to HNO_3 with said dielectric barrier discharge reactor.

[c5] 5. The process of claim 1, wherein said oxidizing step is adapted to result in a mole ratio of SO_2 to NO_2 of at least four to one.

[c6] 6. The process of claim 1, said scrubbing solution comprising ammonia, ammonium sulfite, ammonium sulfate, and water, and
having a pH between 6 and 8.

[c7] 7. The process of claim 1, wherein said aerosol removal means is a wet electrostatic precipitator.

[c8] 8. The process of claim 1, wherein said scrubbing step results in the formation of ammonium sulfate, the process further comprising the step of withdrawing ammonium sulfate from the scrubbing solution.

[c9] 9. The process of claim 4, wherein said scrubbing step results in the formation of ammonium nitrate, the process further comprising the step of withdrawing ammonium nitrate from the scrubbing solution.

[c10] 10. A process for removing SO_2, NO, NO_2, and Hg from a gas stream comprising the steps of
a. oxidizing at least a portion of the NO in a gas stream to NO_2, andat least a portion of the Hg in a gas stream to HgO, with an oxidizing means, followed by
b. scrubbing at least a portion of the SO_2, NO, and NO_2

from the gas stream with a scrubbing solution comprising ammonia, and
having a pH between 6 and 8, and
c. removing at least a portion of any ammonia aerosols generated from the scrubbing step, and HgO, from the gas stream with an aerosol removal means.

[c11] 11. The process of claim 10, wherein said oxidizing means is an electrical discharge reactor.

[c12] 12. The process of claim 11, wherein said electrical discharge reactor is a dielectric barrier discharge reactor.

[c13] 13. The process of claim 10, wherein said aerosol removal means is a wet electrostatic precipitator.

[c14] 14. The process of claim 10, said scrubbing solution comprising ammonia, ammonium sulfite, ammonium sulfate, and water, and
having a pH between 6 and 8.

[c15] 15. The process of claim 14, wherein said scrubbing step results in the formation of ammonium sulfate, the process further comprising the step of withdrawing ammonium sulfate from the scrubbing solution.